



# Australian Bureau of Statistics

## 1216.0.55.003 - Australian Statistical Geography Standard: Design of the Statistical Areas Level 4, Capital Cities and Statistical Areas Level 3, May 2010

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## Summary

### Main Features

#### PREFACE

The Australian Bureau of Statistics intends to replace the current Australian Standard Geographical Classification (ASGC) with the new Australian Statistical Geography Standard (ASGS) with effect from July 2011.

The ASGC is used for the collection and dissemination of geographically classified statistics. The ASGC has been the foundation of the statistical geography used by the ABS, and many other organisations, since 1984. Over the years it has been criticised on many grounds including: lack of stability over time, inconsistent population sizes of the defined areas and that some of the areas were not meaningful. Furthermore it is incompatible with mesh blocks.

The ASGS has therefore been developed to address these shortcomings. It will be based on mesh blocks and will define more stable, consistent and meaningful areas than the ASGC. It will be the new basis for the publication of the complete range of ABS spatial statistics. The ASGS will become the essential reference for understanding and interpreting the geographical context of ABS statistics.

This is the third and final information paper designed to explain aspects of the ASGS. Its purpose is to provide background to stakeholders regarding the Statistical Area 3s (SA3s) and 4s (SA4s) of the ASGS to facilitate consultation on their design.

Specific information is available on the current ASGC and the proposed ASGS respectively in the following ABS publications: [Australian Standard Geographical Classification \(ASGC\), July 2009](#) (cat. no. 1216.0), [The Review of the Australian Standard Geographical Classification](#) (cat. no. 1216.0.55.001) and [Outcome from the Review of the Australian Standard Geographical Classification](#) (cat. no. 1216.0.55.002).

For more information on statistical geography please view the [ABS Geography](#) portal.

## Introduction

### INTRODUCTION

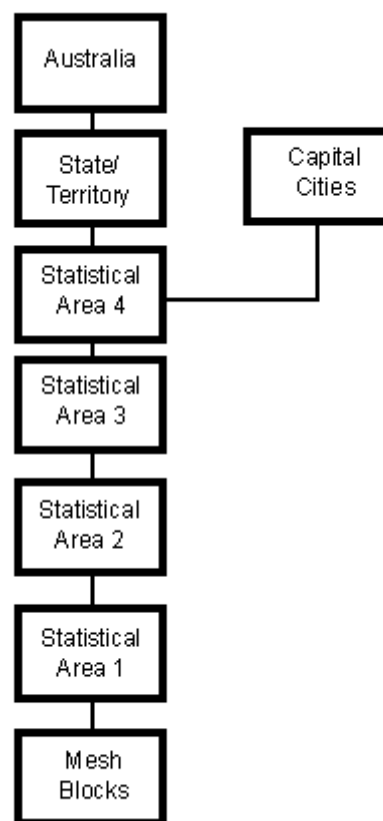
The Australian Bureau of Statistics (ABS) intends to replace the current Australian Standard Geographical Classification (ASGC) with the new Australian Statistical Geography Standard (ASGS) with effect from July 2011. Specific information is available on the current ASGC and the proposed ASGS respectively in the following ABS publications: Australian Standard Geographical Classification (ASGC) July 2009 (cat. no. 1216.0), Review of the Australian Standard Geographical Classification (cat. no. 1216.0.55.001) and Outcome from the Review of the Australian Standard Geographical Classification (cat. no. 1216.0.55.002).

The purpose of this paper is to provide background to stakeholders regarding the Statistical Areas Level 3 (SA3s) and 4 (SA4s), and the Capital Cities of the ASGS and, to seek input from stakeholders to facilitate consultation on their design.

The SA3 and SA4 are two of the new levels in the hierarchy of regions defined by the ASGS. As depicted in diagram 1, mesh blocks build up to SA1s, which in turn build up through the SA2, SA3, SA4, State and Territory to the whole of Australia.

Capital Cities will be constructed of whole SA4s.

Diagram 1: **The ASGS Main Structure**



For complete structural diagrams of the ASGS, please see the Appendix.

The SA3 level is intended to represent a regional sub-state geography, broadly similar to the current Statistical Divisions in regional areas and Statistical Subdivisions within the major cities.

The SA4 level is intended to replace the current ABS Labour Force Regions (LFRs).

# Statistical Areas Level 4

## STATISTICAL AREAS LEVEL 4 (SA4S)

The SA4 level represents the largest sub-state regionalisation of the main structure in the ASGS. Its main purpose is to provide the geographical basis for labour force statistics.

The current LFRs have a number of weaknesses, which have severely compromised their usefulness.

1. They are not integrated into the ASGC. They are built from ASGC regions at the time of each Census. The underlying ASGC units are reviewed annually, while the LFRs remain stable. Consequently, between Censuses, the LFRs and the ASGC drift out of alignment, limiting direct comparison until they are realigned at the next Census.
2. The existing regions are built around administrative boundaries rather than any objective analysis of the Australian labour market geography. In many cases the existing LFRs split labour markets.
3. Their population sizes are extremely inconsistent; this means the very small regions have high relative standard errors due to the low sample, which is standardised, only within each state.
4. Many of the more remote LFRs are spatially very diverse although this is to a degree inevitable due to the low population densities.

The ABS will address these weaknesses in the design of the SA4s.

The SA4s will be fully integrated into the ASGS. They will remain stable between Censuses, as will the underlying geographical units. This will allow a direct comparison between Labour Force data and other data released by the ABS on the ASGS main structure.

Labour markets will be a key consideration in the design of SA4s. Labour markets are geographic regions, which have a high degree of interconnectedness or overlap between the labour supply (where people live) and demand (where people work). These clusters of labour supply and demand occur because of the place of work being restricted by the commuting distance. For example, most people who live in Bendigo will work in Bendigo rather than Melbourne. Consequently, labour markets may be identified using travel to work data and the resulting regions provide an ideal platform for the analysis of labour force data.

The ABS has consulted with a number of experts on labour market geography to identify labour markets within Australia through the an analysis of the 2006 Census travel to work data (James Newell, Monitoring Evaluation Research Associates (MERA), New Zealand, Bill Mitchell, Martin Watts and Michael Flanagan, Centre of Full Employment and Equity (CofFEE), The University of Newcastle).

The ABS has worked with James Newell (MERA) to identify Australian labour markets using a version of the Coombes Algorithm and the 2006 Census Statistical Local Area (SLA) travel to work matrix. The resulting labour markets are characterised by a large number of very small regional labour markets comprised of single SLAs with a smaller number of medium sized labour markets around regional centres and very large labour markets representing the major metropolitan centres. While this may be an accurate reflection of Australian labour markets, it does not create an ideal output geography for labour force data which is

collected using a sample survey requiring large and consistently sized geographic regions.

CofFEE have produced an alternative labour market geography called CofFEE Functional Economic Areas (CFEAs). These are defined using the Intramax Algorithm (Mitchell, Bill and Watts, 2007) and the 2006 Census SLA travel to work matrix and are available through their website [http://e1.newcastle.edu.au/coffee/functional\\_regions/](http://e1.newcastle.edu.au/coffee/functional_regions/). The Intramax algorithm uses an incremental aggregation approach to create a hierarchical diagram of commuting relationships between all SLAs, this allows much larger and more consistently sized geographic regions to be created while still respecting the commuting interactions.

The ABS has used these two versions of Australian labour markets to inform the design of the SA4 regions. This process essentially involves amalgamating very small regional labour markets and splitting major metropolitan labour markets into more evenly sized regions whilst preserving the suitably sized regional centre labour markets. Given that metropolitan labour markets are naturally larger than those in regional areas, larger population SA4s were created within the major cities while smaller SA4s were created in regional areas. The desired minimum population of 100,000 was set as a compromise between preserving the labour markets of large regional centres and minimising the extent to which unacceptably high Relative Standard Errors (RSEs) occur. This does not guarantee that all SA4 regions will have acceptable RSEs for all data items. Such a guarantee is impossible given that the sample is designed for the release of data at a state and national level.

State boundaries are a limiting factor in the extent to which SA4s can reflect labour markets. Several labour markets cross state boundaries, for example, Gold Coast-Tweed, and Canberra-Queanbeyan. As far as possible the SA4 design will represent this reality, but the fact that the SA4s must add up to the various states and territories will compromise the representation of some labour markets at the state borders.

In the light of the above:

1. SA4s will be made up of whole SA2s.
2. The SA2s will be combined into SA4s based on an analysis of 2006 Census travel to work data.
3. SA4s will be designed independently of the existing LFRs, although in some areas the results may be similar.
4. In regional areas, SA4s will represent a single, or clusters of labour markets, with an average population of between 100,000 and 300,000 people.
5. Capital city labour markets will be broken up into sub markets of between approximately 150,000 and 500,000 thousand people based on an analysis of travel to work data.

## Capital Cities

### CAPITAL CITIES

The Capital Cities represent each of the eight state and territory capitals and are currently defined by a single Statistical Division (SD) in each state. The Capital City SD has two main uses. First, to provide a stable definition of each of the cities for data such as the Consumer Price Index that is only collected for Capital Cities. Second, to define the Capital City/Rest of State split used in the presentation of population survey data other than labour force.

To facilitate the comparison of labour force data with this other data capital cities will be defined from aggregations of SA4s. Given that SA4s are primarily designed to represent labour markets this implies the capital city definition will be a broad socio-economic definition, rather than a tight reflection of the built up area of the capital city and its likely medium term expansion.

This has the added advantage of providing a greater degree of consistency to the definitions of the capital cities. The current capital city SD boundaries vary considerably in the manner in which they bound each states capital city. For example, the Sydney SD is a broad socioeconomic definition of Sydney that contains its labour market and extends well beyond the built up edge of the city. In contrast the current Adelaide SD barely contains the 2006 Adelaide Urban Centre and Locality (UCL) boundary and will likely be crossed by the UCL by 2011.

It is important to understand that these SA4 derived definitions of capital cities are designed to provide a stable and consistent boundary that reflects the socioeconomic extent of the city over the next twenty years. It is not a definition of the built up area of each capital city, this is provided by the UCL boundaries. From 2011 the UCLs will be aggregations of Statistical Area 1 boundaries updated after each Census. In addition to these two definitions of capital cities, from 2011, the ABS will also define Significant Urban Areas (SUAs). SUAs will be built from aggregations of Statistical Area 2 (SA2) boundaries and provide a similar definition to the current SDs.

To define the edge of the capital cities, in addition to the current labour market, it will be necessary to consider likely future directions in urban planning to ensure consistent and stable capital city boundaries over the next 20 years. Consequently, the ABS has reviewed the boundaries of the current capital cities on the basis that:

1. Capital cities will be defined using whole SA4s to provide a consistent, stable, socioeconomic definition of each city.
2. Capital city SA4 design will take into account any likely changes in urban development and the transport network over the next 20 years.

The impact of this on the definition of each capital city compared with the current (SD) definition varies throughout Australia. Below is a brief description of the impact of the changes on the definition of each capital city.

## **Sydney**

The Capital City definition of Sydney remains essentially unchanged from the current Sydney SD, apart from several small differences around National Parks in the south and west. These do not involve any population.

## **Melbourne**

The Capital City definition of Melbourne has been extended from the current SD particularly in the north and west. In the northwest, Census travel to work data showed significant commuter interaction outside the current Melbourne SD boundary. Using this data to inform the design, the boundary has been extended as far as the towns of Bachus Marsh, Macedon, Lancefield, Wallan and Kinglake. To the south and east, the boundary remains unchanged with the exception of a small area east of Warburton.

## **Brisbane**

The Brisbane Capital City definition has been extended from the current SD primarily in the south and west. In the south west the boundary extends to the NSW border to include Beaudesert and Boonah. While the southernmost parts of this area are quite rural in character, its low population means it cannot be contained in a separate SA4. Given that around one third of the workforce is currently employed in Brisbane, this area has been included in the Brisbane Capital City.

The boundary between the Gold Coast and Brisbane has been adjusted south from the Logan River to the Pimpama River, as the travel to work data shows the area between these two rivers to have significantly stronger links with Brisbane than the Gold Coast.

In the north west, the new Capital City definition extends out to include Laidley, Esk and Kilcoy where Census data shows a large proportion of commuter interaction with Brisbane and Ipswich.

## **Adelaide**

The Capital City definition of Adelaide has extended from the current SD to the north and significantly to the east. To the east the Capital City definition has extended to include a larger area of the Adelaide Hills; towns such as Mt Barker and Lobethal are now included because of the significant commuting interaction with Adelaide. In the north the new boundary has been extended out to contain Gawler as well as Roseworthy and Two Wells, both of which have been identified as possible future growth areas in the Greater Adelaide 30 year plan.

## **Perth**

The Perth Capital City definition has been extended from the current SD in the south to include Mandurah and Pinjarra. Travel to work analysis shows these areas have strong labour market links with the south west of Perth. The remainder of the Perth Capital City definition remains unchanged from the current SD.

## **Hobart**

The Capital City definition for Hobart remains unchanged from the current SD, apart from a small adjustment on the outskirts of Sorrell to the north east of Hobart. This change involves only a very small population and results from differences between the SA2 design and Statistical Local Areas. Travel to work data suggests that the labour market of Hobart extends outside this definition of Hobart and this is reflected in the adjacent SA4. This extended definition of the Hobart labour market was considered impractical for Capital City purposes and consequently the existing SD definition was retained, this contains the vast majority of the population of the Hobart labour market.

## **Darwin**

The Darwin Capital City definition remains unchanged from the current SD. Travel to work data shows that the existing boundary accurately reflects the Darwin labour market.

## Canberra

The Capital City definition of Canberra now extends to include the entire ACT. While this involves a large change in area from the current SD the difference in population is minimal. The non-urban component of the ACT has too small a population to be included in a separate SA4 and consequently the SA4 defining Canberra must include the entire ACT.

## Statistical Areas Level 3

### STATISTICAL AREAS LEVEL 3 (SA3S)

The SA3s have the least precise criteria of any level of the ASGS. The ABS does not intend to collect any data at the SA3 level not already available at the SA2 level. There are therefore no statistical criteria that are not already accommodated at the SA2 level. The population of the SA3s is expected to be between 30,000 and 130,000. A lower population limit slightly larger than the most populous of the SA2s and the upper similar to that anticipated for the least populous SA4s.

Functional areas are a consideration in SA3 design; one or more SA3s should be able to represent a regional city and its area of economic influence. In much of remote and outer regional Australia, this is not possible, because of the absence of such regional cities. In these areas, the SA3s should represent areas that are meaningful to users, for example the Wimmera in Victoria or the Eyre Peninsula in South Australia.

Apart from functional areas other factors that can be taken into consideration are:

- the indigenous population
- the regional economy
- topography
- regional identity.

## Time Series

### TIME SERIES

While the new regions will give a better platform for the analysis of time series into the future, it will also create a break in time series, particularly for Regional and Labour Force statistics.

The ABS will respond to this issue in several ways.

1. Census Data will be available on both the ASGS and ASGC regions in 2011, with the exception of census collection districts.
2. It is possible to recast historical Labour Force statistics on to the new SA4s. The ABS will consult with stakeholders on the most appropriate way of achieving

this.

3. Some historic demographic data will be recast on to the ASGS regions.
4. The ABS will create a series of population and area based concordances between the Labour Force Regions, ASGC regions and the new ASGS regions.
5. Preserving the ASGC statistical divisions was a criteria in the design of the SA2 level of the ASGC. It is therefore possible to reconstruct data for statistical divisions from SA2 data released under the ASGS.

## Consultation

### CONSULTATION PROCESS

This paper is the final paper on the design of the ASGS. The boundaries for the SA3, SA4 and Capital City levels of the ASGS will be finalised by the end of September 2010 in preparation for the publication of the ASGS by December 2010.

Some consultation has occurred with key stakeholders prior to the development of the draft boundaries, however input is now being sought from users.

The ABS will assess all submissions prior to finalising the boundaries.

### To obtain copies of the draft boundaries

Draft boundaries are available in GIS format (MapInfo or ESRI Shapefile) from the Geography Section of ABS. Please email [geography@abs.gov.au](mailto:geography@abs.gov.au) with the subject heading **ASGS Review - SA4 boundaries**, and provide your name, title, organisation, email and postal address and a copy will be sent to you.

### Written submissions

Interested parties are invited to make submissions to the ABS in relation to the issues and boundaries.

**Submissions should be made to the ABS by no later than 5 pm, 2 July 2010.**

Email provision of submissions is preferred. The ABS encourages organisations and individuals to make submissions in either PDF or Microsoft Word format. GIS files should be in either MapInfo or ESRI Shapefile format. Submissions should be sent to [geography@abs.gov.au](mailto:geography@abs.gov.au) (submissions should use the word " **ASGS submission** " in the title of the email).

If required, submissions can also be sent by post addressed to:

The Assistant Director

Geographic Area Classification

Australian Bureau of Statistics



PO Box 10

BELCONNEN ACT 2616

General enquiries can be directed to:

Mr Alec Bamber

Geography Section

Australian Bureau of Statistics

02 6252 6365

## About this Release

The information paper discusses the design of the SA3, SA4 and Capital City regions of the ASGS, which will become current from 1 July 2011. It calls for stakeholder comment on these regions, which will be available by emailing [geography@abs.gov.au](mailto:geography@abs.gov.au).

# Explanatory Notes

## Bibliography

### BIBLIOGRAPHY

Mitchell William, Bill Anthea, Watts Martin, 2007, Identifying functional regions in Australia using hierarchical aggregation techniques, **Working Paper No. 07-06 Centre of Full Employment and Equity**, The University of Newcastle.

## Structures of the ASGS (Appendix)

### APPENDIX

#### STRUCTURES OF THE ASGS

The structures of the ABS represent different aspects of Australia's geography. Each consists of a hierarchy of regions.

The ABS structures are those regions that are defined and maintained by the ABS.

The non ABS structures are those regions that are not defined and maintained by the ABS.

They represent the administrative regions of government and semi-government organisations.

Diagram 2: ABS Structures

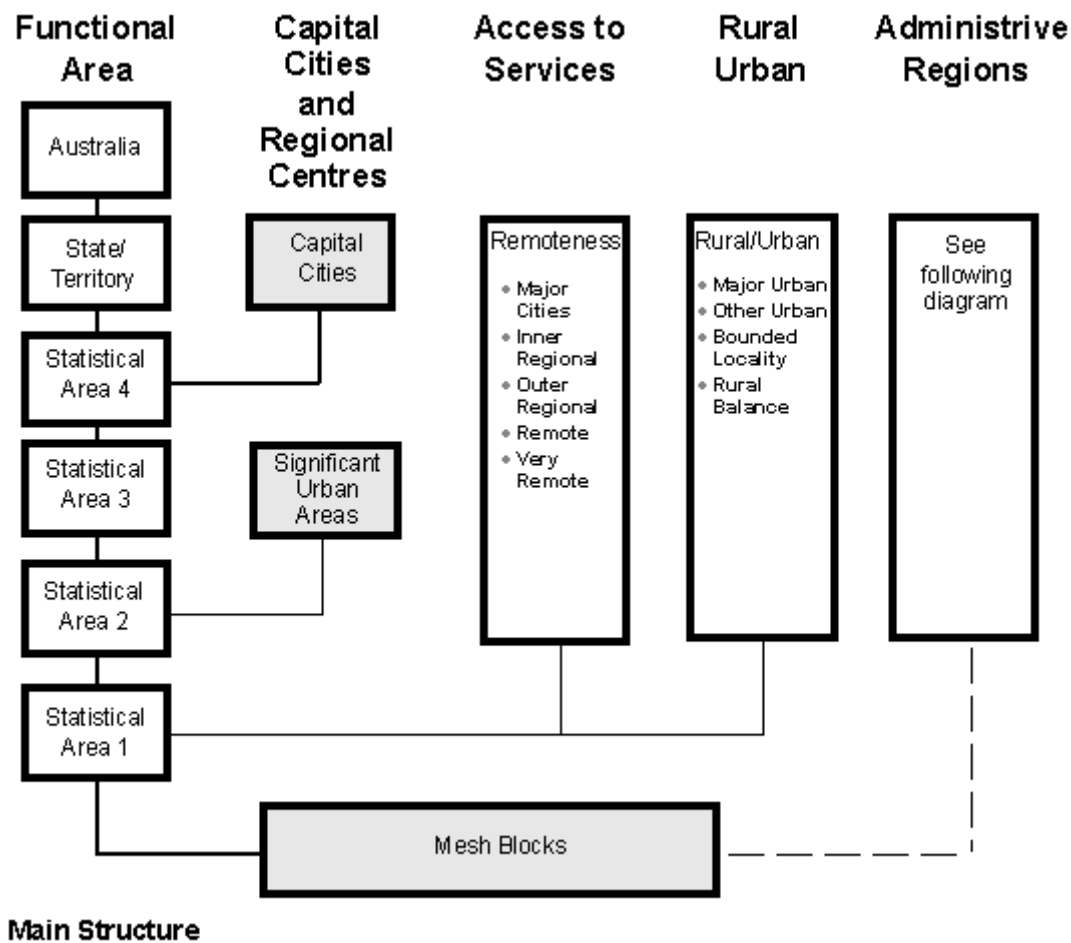
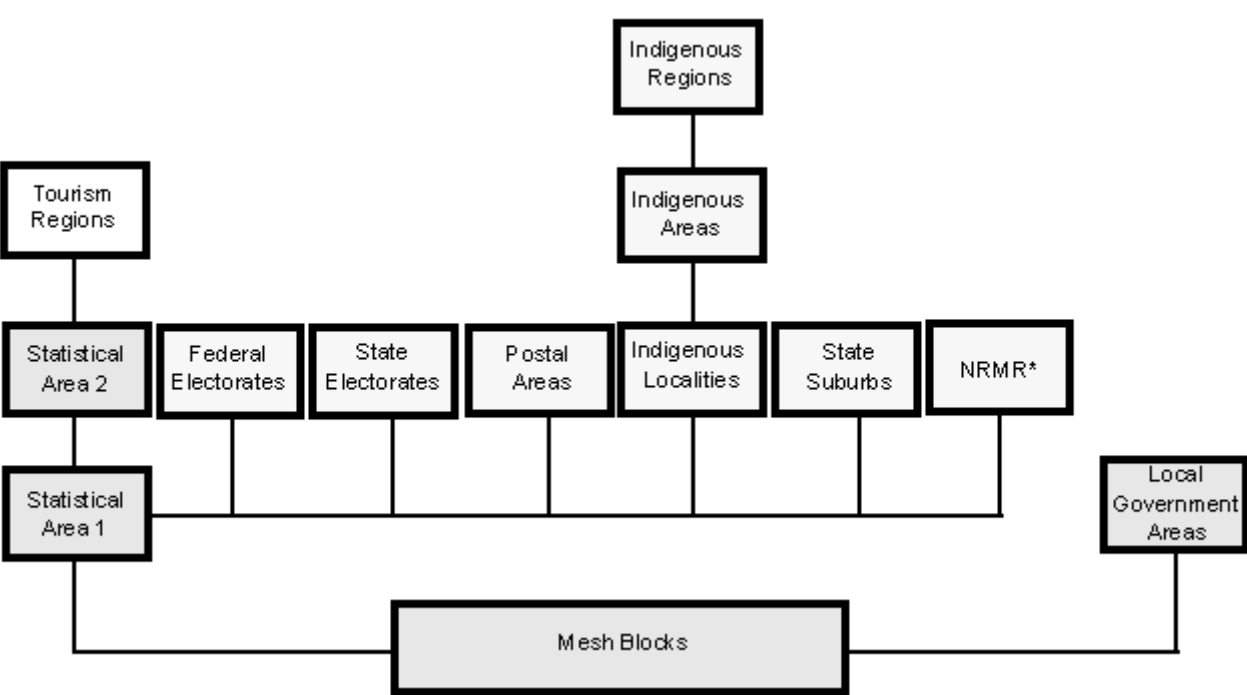


Diagram 3: Non ABS Structures



\* Natural Resource Management Regions

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